

REMARKS

This Amendment is responsive to the Office Action mailed on June 25, 2004. Claims 1-29 are pending in the application. Claims 1, 15 and 27 have been amended to more specifically claim Applicants' invention.

The Examiner has rejected Claims 1-29 under 35 U.S.C. 103(a) as being unpatentable over Keith et al. (U.S. Patent No. 4,785,349). This rejection is respectfully traversed.

Discussion of Prior Art

The Keith et al. reference fails to teach or suggest each of Applicants' claimed elements.

The Keith et al. reference teaches a system for compressing and formatting a full motion color digital video signal. The Keith et al. reference teaches an apparatus for decoding a compressed signal to enable display of full motion video images at normal video frame rates. (col. 1, lines 42-47). The digital video interactive system of FIG. 1 comprises a recording system 6 and a playback system 8. The recording system includes sources 10, 12 and 14 that provide, respectively, a multi-channel sound signal S1, a color motion video signal S2 and an auxiliary data signal S3. An encoder 16 encodes and combines signals S1, S2 and S3 to form a digital recording signal S4 ("bit-stream") that is recorded on a compact disc read-only memory (CD-ROM) disc 20 by means of a CD-ROM recorder 18. Auxiliary data signal S3 may comprise interactive data associated with the video or audio signals or some other type of digital data which may be independent of the audio or video data. (col. 4, lines 15-28) The average data rate of the bit-stream S4 is controlled by a selection of encoding parameters to equal the standard CD-ROM record/playback bit-rate of about 1.2 mega-bits per second. (col. 4, lines 29-33).

The Examiner specifically cites to Column 9, lines 63-68 of the Keith et al. reference, which teaches that after compression, the compressed video streams (S10) are recovered from buffer store 232 and applied to a byte count monitor 234 and to a decode time monitor 236 which

identify, respectively, the number of data bytes and the decoding time for each individual frame of a video sequence. Since audio and auxiliary data will be added to each frame, the average byte count should be less than the total number of bytes allowed per frame in the bit stream S4. Monitor 234 provides an accumulated average byte count over a sequence of video frames (alternatively monitor 234 may be arranged to count bytes on a frame-by-frame basis). This count is used for setting compression thresholds in a compression threshold control unit 238 to maintain the average byte count of signal S10 below 4500 bytes per frame. This allows room in the frame for audio and other data that is later added. Oversized video frames that cannot be reduced to 4500 bytes are accounted for during reformatting by borrowing space from an earlier frame. Decode time monitor 236 measures the time it takes to decompress each sub-frame of the compressed digital video signal S10. This measurement may be accomplished by applying the signal S10 to a decoder such as processor 30 of the playback system 8 and measuring the processor decode time. For an exemplary playback rate of 30 FPS, the decode time of a frame should be no more than 1/30th of a second. When this monitor detects a larger decode time, thresholds in the threshold control 238 are adjusted to reduce the decode time of the "oversized" frame. (col. 10, lines 19-33)

Alternatively, threshold 238 can be adjusted to merely keep the running average of the decode time below 1/30th of a second. With such a strategy, there is no need to repeat a compression, even if it exceeds the allowed decode time. In other words, the average can still be acceptable even if individual frames are not. The playback system can cope with such temporary excesses in the decode time, without any effect on the playback rate, by using a technique of borrowing decode time from "short" frames (i.e., those frames that require less than 1/30th of a second to decode) (col. 10, lines 34-46).

In the Keith et al. reference the oversized frames that cannot be reduced are accounted for by borrowing space from an earlier frame. In an alternative embodiment, the Keith et al. reference teaches that the threshold can be adjusted to keep the running average of the decode time below the threshold. The Keith et al. reference teaches that there is no need to repeat a compression, even if the oversized frame exceeds the allowable decode time. The system of Keith et al. uses a technique of borrowing decode time from the "short" frames.

In contrast to Keith et al., with Applicants' claimed invention, if the estimated time to decode the current segment exceeds a predetermined decoder time period, in order to prevent a decoder error the encoder either (a) re-encodes said current video signal segment such that it can be decoded within said decoder time period, or (b) encodes a subsequent video signal segment to enable decoding thereof without reference to said current segment. Whether the current frame is re-encoded or the subsequent frame is encoded to be decoded without reference to the current segment is based on available processing time at the encoder.

In other words, with Applicants' claimed invention, if the time for decoding the encoded video segment exceeds the "predetermined decoder time period" a decoder error can be caused. For example, if the current frame cannot be decoded in the predetermined time period, it may be dropped, resulting in display artifacts and prediction errors in subsequent frames (see, e.g., Applicants' specification at page 12, lines 1-8). There are two options for preventing the error, option (a) is that the encoder can re-encode the current segment to reduce the decode time of the current encoded segment. As discussed in Applicants' specification, this can be accomplished in a variety of ways during re-encoding, such as skipping blocks, increasing quantization, dropping coefficients, restricting motion, and/or other optimization techniques (see, e.g., Applicants' Specification, page 13, lines 11-18).

Option (b) is to encode the subsequent video segment so that it can be decoded without reference to the current segment (e.g., as an Intra-coded segment or I-Frame as discussed page 13, line 18 to page 14, line 5). By encoding the subsequent frame as an I-Frame, any prediction errors caused at the decoder due to the previous oversized frame will be avoided. The techniques of Keith et al. do not provide such advantages.

The decision to use option (a) or option (b) depends on a processing time available at the encoder. For example, where the encoding comprises real-time encoding, the encoder may not have sufficient processing time available to re-encode the current frame, so option (b) would be used. Similarly, for non-real time encoding, there may be sufficient processing time available to re-encode the current frame so that it can be decoded within the predetermined time period. (see, e.g., Applicants' specification, page 13, lines 11-20)

Keith et al. does not disclose or remotely suggest to re-encode a video segment if it cannot be decoded within a predetermined decode time period as claimed by Applicants. Rather, in Keith et al., when a frame cannot be decoded in the allotted time, additional time to decode this frame is “borrowed” from a frame that does not require its full decode time. Such “borrowing” is allowed in Keith et al. as long as the “average” decoder frame time is within a threshold. Further, Keith et al. makes no mention of encoding a subsequent segment so that it can be decoded without reference to the next segment when the current video segment cannot be decoded within the predetermined time period, as claimed by Applicants.

Finally, the Keith et al. reference does not disclose or remotely suggest deciding between two options for preventing a decoding error based on processing time available at the encoder, as claimed by Applicants.

Regarding claims 10, 11, 24 and 25, the Examiner substitutes specific evidentiary citations with Official Notice, stating “...the claimed “block transform coding” is a well known process of compression and decompression of video signal in the prior art of record (i.e., MPEG encoding/decoding process)” and renders the claim language obvious. Applicants respectfully traverse such an assertion of Official Notice. The Examiner has oversimplified the claim elements in the claims. For example, claim 11 claims in part, “said encoding step performs block transform coding, the block transform coding provides different types of blocks, and said model monitors the number of different types of blocks provided during the block transform coding of said video signal segment.” The claims must be examined for each and every claimed element and not merely a gist of the claim. The Examiner has failed to fully identify Applicants’ claimed functions performed by the model in claims 10, 11, 24, and 25.

Since the Applicants’ have traversed the Examiner’s rejection, the Applicants request that the Examiner provide an Affidavit or other evidence that specifically teaches or suggests all of the elements of claims 10, 11, 24 and 25, as required by MPEP 2144.03.

In view of the above, Applicant respectfully submits that the claimed invention would not have been obvious to one skilled in the art in view of the Keith et al. reference, or any of the other prior art references of record, taken alone or in combination. Moreover, since independent claims 1, 15 and 27 are not obvious, then claims 2-14, 16-26 and 28-29 dependent thereon are

believed to be allowable. If an independent claim is non-obvious under 35 U.S.C. 103, then any claim depending therefrom is non-obvious. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

Further remarks regarding the asserted relationship between Applicants' claims and the prior art are not deemed necessary, in view of the foregoing discussion. Applicants' silence as to any of the Examiner's comments is not indicative of acquiescence to the stated grounds of rejection.

Conclusion

In view of the above, entry of the present amendment and reconsideration and allowance of each of the claims is respectfully requested. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicant's undersigned attorney.

Respectfully submitted,



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